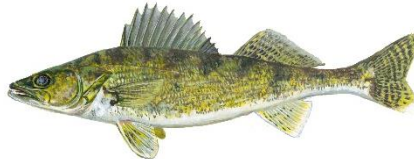


Summary Report: Mississippi River Pool 8 Experimental Spring Walleye Juvenile and Adult Assessment, 2018 and 2019

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INTRODUCTION

Since 1994, the Mississippi River Fisheries Team has routinely sampled juvenile and adult walleye and sauger in the tailwaters of Lock and Dams in fall using pulsed direct current night electrofishing. In contrast, most of Wisconsin Department of Natural Resources' (WDNR) walleye sampling occurs in spring.

The earliest reports of locating walleye and sauger spawning areas in the Upper Mississippi River were conducted by Hubley in 1960 (Gebken and Wright, 1972). He collected 12 ripe males and 14 unripe female walleye in three feet of water over a sand bottom in flooded willows about 300 yards below Lock and Dam 7. In 1961, Hubley sampled for spawning fish using fyke nets and electrofishing; they found none. In 1969, Gebken and Wright (1972) collected a total of 68 (including 37 ripe males, 7 ripe females) walleye during two nights in riprap. They also recovered walleye eggs at these locations. During 1970, they found no spawning concentrations.

Using radio telemetry, Holzer and Von Ruden (1982) did locate spawning fish and eggs in flooded Mississippi River reed canary marshes surrounded by timber with a slight current. Holzer and Von Ruden (1983) found half of their 10 radio-tagged fish spawned in one marshy location surrounded by flooded timber in Pool 8. Subsequent night electrofishing in this area produced 87 spawning walleye. Subsequently, they collected fertilized eggs. Von Ruden and Holzer (1984) collected 168 walleye in flooded terrestrial vegetation. During 1985 and 1986, they collected 22 and 61 fish, respectively. In Pool 13, Pitlo (1989) found substrates at spawning sites comprised of sand, gravel, and cobble. He collected walleye eggs in main channel border habitat and on outside portions of river bends.

Outside of the Mississippi River, Priegel and Hickey (1970) documented spawning in flowing flooded marsh vegetation in the Wolf and Fox rivers of the Lake Winnebago system, Wisconsin. The Oshkosh Field Unit routinely electrofishes these marshes and adjacent backwaters. They catch large numbers during the daytime, sufficient to derive population information (R. Koenigs, Pers. Comm.). Ickes (1999) found walleye spawning principally in flooded backwater habitat. Spawning locations varied by water surface elevations; during a high-water spring, fish spawned in flooded backwaters, but during lower elevations, some spawning occurred in side channel borders.

During 2018 and 2019 we experimented with spring sampling in Navigation Pool 8. Our objectives included 1) to evaluate the possibility of comparing results with routine WDNR spring sampling, 2) to

compare Mississippi fall and spring sampling results using direct current electrofishing, 3) to determine if large numbers of walleye could be caught in the spring, and 4) to document potential spawning locations.

METHODS

During eight dates in 2018 and 2019, we used electrofishing to sample walleyes in a variety of micro-habitats. During seven dates we sampled during daytime, while on May 2, 2019 we sampled at night. We did a total of 61 runs which had a mean depth of 1.7m (0.5 to 3.8m) and an average duration of 12.4 minutes (2.3 to 40.0 minutes). WDNR crews completed 41 runs in backwater or flooded terrestrial micro-habitat, and 20 runs in main channel borders, secondary and tertiary channel locations (Figures 1 & 2; Table 1). We sexed fish based on gamete expression and measured them to the nearest 1 mm.

RESULTS

WDNR crews recorded similar water temperatures between years (Table 2) and flows were much higher in 2019 (77,173 vs. 158,095 cfs). We caught a total of 35 walleye and calculated a mean catch per hour (CPH) of 4.45 in 2019 and 0.73 in 2018 (Table 3). Correspondingly, the 2019 mean catch per mile (2.88) exceeded 2018 (0.73). During both years, crews caught 5.48 fish per hour in channels and 0.95 in backwaters or flooded terrestrial. ANOVA results suggest no significant difference ($p=0.1197$).

TABLE 2. TEMPERATURES AND FLOWS (CUBIC FEET PER SECOND) DURING 2018 AND 2019 SPRING WALLEYE SAMPLING.

	MEAN_	MIN_	MAX_	MEAN_	MIN	MAX	
YEAR	TEMP °C	TEMP °C	TEMP °C	FLOW	FLOW	FLOW	n
2018	9.8	4.5	15.3	77173	50400	87700	33
2019	9.4	4.8	12.6	158095	148362	166600	26
BOTH	9.6	4.5	15.3	112834	50400	166600	59

TABLE 3. CATCH PER UNIT EFFORT OF DURING 2018 AND 2019 SPRING WALLEYE SAMPLING.

	MEAN	STANDARD	COEFFICIENT OF	MINIMUM	MAXIMUM	HOURS	MEAN CATCH	STANDARD	TOTAL	NUMBER
YEAR	CATCH PER HR	DEVIATION	VARIATION	CATCH PER HR	CATCH PER HR	SHOCKED	PER MILE	DEVIATION	MILES	OF RUNS
2018	0.73	1.98	2.71	0	8.55	7.472	0.73	2.19	10.11	33
2019	4.45	9.82	2.21	0	41.2	5.129	2.88	5.79	5.94	28
BOTH	2.17	8.11	3.74	0	56.18	12.601	1.72	4.34	16.05	61

The highest CPH included stations 18 and 17 in the tailwater, followed by station 154 in I-90 bay, and stations 104, 1154 and 1156 located in the East Channel Bay. These stations all occurred in the far upper pool. Compared to routine fall tailwater electrofishing surveys (71.2 per hour, $n=146$), spring tailwater results were lower (12.2 per hour, $n=9$). Greater spring water depths may have influenced this difference. Night samples did not produce a significantly different ($p=0.1184$) catch rate (9.4 per hour, $n=6$) than daytime (1.7 per hour, $n=55$).

Size of walleye varied between 6.0 and 23.7 inches (Figure 3). We identified a total of four ripe males. We classified all nine females as "green". We could not determine sex for 22 fish; and classified 9 as immature or spent (Table 1).

DISCUSSION

We found spring catch rates disappointingly low, especially compared to fall. Eight days of sampling produced only 35 walleye. During fall, this amount of sampling generally results in greater than 500 fish. High spring water levels, especially during 2019, limited available sampling locations. We've found electrofishing inefficient at depths greater than 2.5m. In the future tailwater night electrofishing may be more effective during lower flow conditions. Talbot (1982) experienced good catch rates during spring young-of-the-year sampling but chose fall to avoid difficulties related to high water.

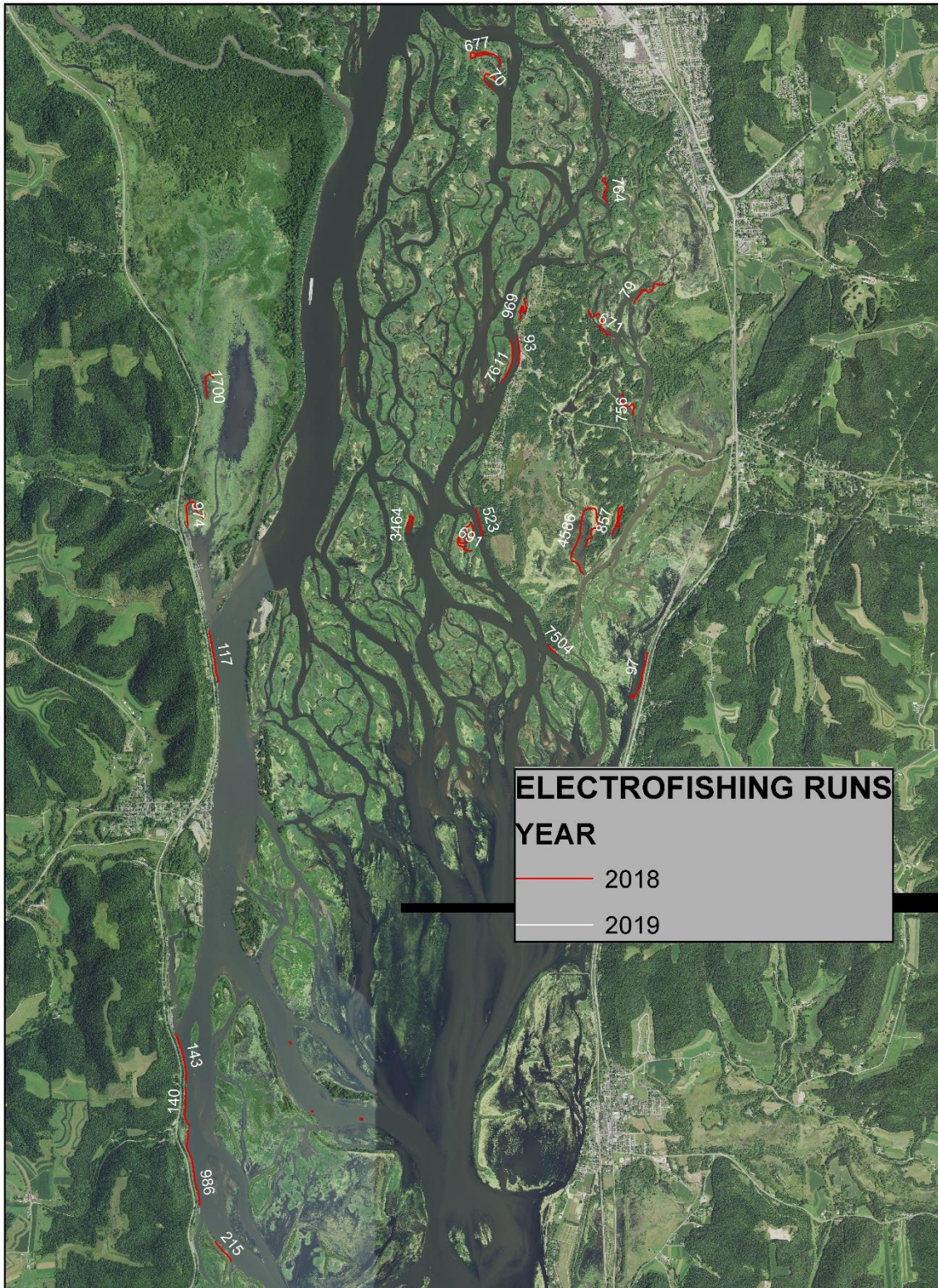
TABLE 1. CHARACTERISTICS OF 61 SPRING WALLEYE ELECTROFISHING RUNS, POOL 8, 2018 AND 2019 (S = spent, R = ripe, I = immature, G = green/hard).

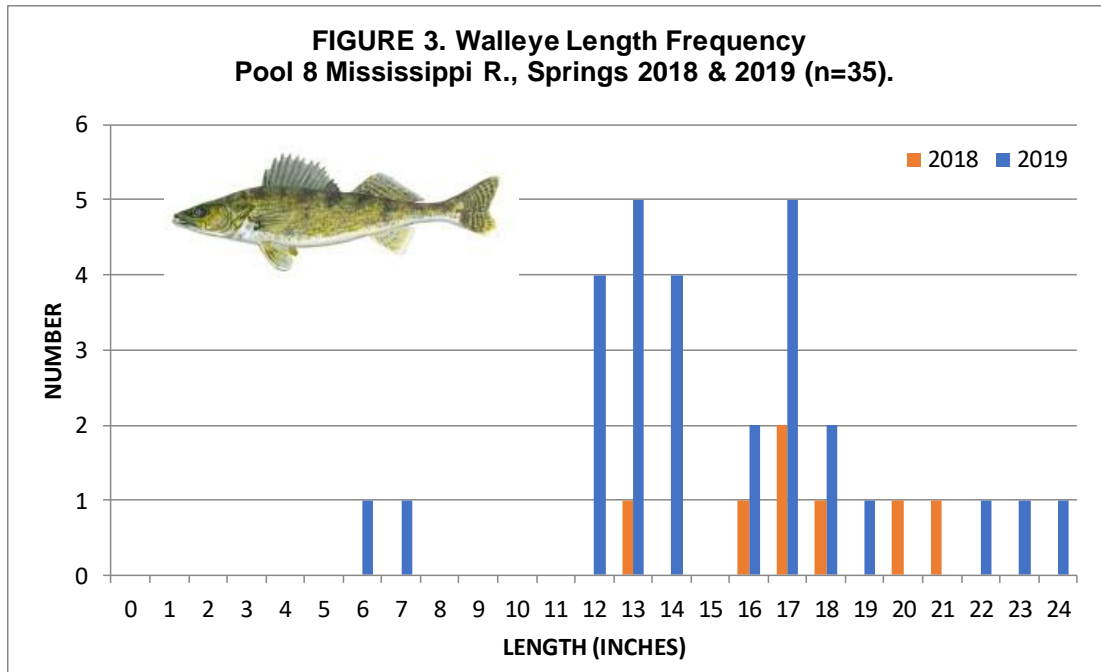
DATE	STATION	WATERBODY	RIVER MILE	START X UTMZ15N	START Y UTMZ15N	END X UTMZ15N	END Y UTMZ15N	RUN LENGTH (M)	START TIME	HOURS	TEMPERATURE °C	DEPTH (M)	LENGTH (INCHES)	SEX	REPRODUCTIVE CONDITION	ID	COM_NAME
03/28/2018	93	WIGWAM SLOUGH	692.1	642587	4844412	642588	4844107	310	13:01:00	0.167	4.7	1.4				37708	no fish captured
03/28/2018	97	SHADY MAPLE	689.9	643973	4841040	643837	4840563	614	14:54:00	0.283	7.6	1.2				37713	no fish captured
03/28/2018	523	WIGWAM SLOUGH	691	642129	4842573	642218	4842267	324	14:18:00	0.167	6	1.3				37711	no fish captured
03/28/2018	3464	BACKWATERS AND SLOUGHS W OF GOOSE IS	690.8	641462	4842380	641425	4842299	347	13:57:00	0.167	6.7	1				37710	no fish captured
03/28/2018	7504	WIGWAM SLOUGH	690	642901	4841119	642997	4841028	136	14:38:00	0.05	5.4	1				37712	no fish captured
03/28/2018	7611	WIGWAM SLOUGH	692.1	642496	4844377	642407	4843925	496	13:38:00	0.042	4.5	1.3				37709	no fish captured
04/24/2018	16	POOL 8 TAILWATER	702.2	635889	4858137	636042	4857922	334	10:26:00	0.233	8.8	1.2				37737	no fish captured
04/24/2018	17	POOL 8 TAILWATER	702	636118	4857843	636489	4857532	519	10:54:00	0.267	8.2	1.8				37738	no fish captured
04/24/2018	104	EAST CHANNEL	702.1	637003	4857952	636926	4857871	1071	11:22:00	0.6	11.6	1.7	20.9	U	S	37739	walleye
04/24/2018	104	EAST CHANNEL	702.1	637003	4857952	636926	4857871	1071	11:22:00	0.6	11.6	1.7	16.4	M	R	37739	walleye
04/24/2018	104	EAST CHANNEL	702.1	637003	4857952	636926	4857871	1071	11:22:00	0.6	11.6	1.7	16.8	U		37739	walleye
04/24/2018	154	I-90 BAY	701.7	636470	4857334	636587	4857249	150	09:52:30	0.117	8.7	1	17.3	U	S	37736	walleye
04/24/2018	833	BAY OFF OF EAST CHANNEL	700.7	637662	4855926	637842	4856218	1092	13:22:30	0.45	10.5	1.7				37740	no fish captured
04/24/2018	1406	EAST CHANNEL	700.1	638370	4855092	638519	4854909	304	13:59:00	0.183	10.5	1.2	12.8	U	I	37741	walleye
04/24/2018	1502	FRENCH L	701.1	638716	4856509	638801	4856323	811	14:35:00	0.333	14	1.4				37742	no fish captured
04/25/2018	70	PREMIUM CLUB POCKET	693.9	642354	4847154	642322	4847058	343	09:35:00	0.167	10	1.6				37744	no fish captured
04/25/2018	79	BACKWATERS AND SLOUGHS W OF GOOSE IS	692.5	644154	4844993	643834	4844770	489	11:18:00	0.217	10.8	1.5				37747	no fish captured
04/25/2018	671	BACKWATERS AND SLOUGHS W OF GOOSE IS	692.3	643350	4844705	643596	4844421	531	11:40:00	0.242	10.2	1.5				37748	no fish captured
04/25/2018	677	BARGE SLOUGH	694	642406	4847303	642274	4847430	673	09:51:00	0.283	9.3	1.7	20.3	U	S	37745	walleye
04/25/2018	691	BACKWATERS AND SLOUGHS W OF GOOSE IS	690.8	642116	4842270	642105	4842124	820	14:21:30	0.392	12.1	1.5				37752	no fish captured
04/25/2018	756	WINGS LAKE	691.7	643696	4843809	643821	4843571	392	12:01:00	0.175	11	1.5				37749	no fish captured
04/25/2018	764	BACKWATERS AND SLOUGHS N OF GOOSE IS	693.2	643540	4846100	643548	4845832	353	10:55:30	0.142	10.1	1.2				37746	no fish captured
04/25/2018	857	DUCK PROJECT	690.8	643670	4842352	643597	4842279	606	12:51:00	0.317	13.1	1				37750	no fish captured
04/25/2018	969	WIGWAM SLOUGH	692.4	642667	4844825	642604	4844593	392	09:08:45	0.15	9.6	0.8				37743	no fish captured
04/25/2018	4586	BEYERS L	690.7	643317	4842161	643291	4841864	1399	13:19:00	0.667	13.6	1.1	18	U	S	37751	walleye
04/27/2018	117	MAIN CHANNEL BORDER-POOL 8	690.1	639289	4841266	639394	4840715	565	12:44:30	0.183	10.3	1.8				37760	no fish captured
04/27/2018	140	RAFT CHANNEL	686.7	639044	4836376	639077	4835954	445	09:54:45	0.213	9.9	1.5				37754	no fish captured
04/27/2018	143	RAFT CHANNEL	687.2	638926	4836957	639048	4836424	568	09:19:30	0.258	9.7	2				37753	no fish captured
04/27/2018	215	RAFT CHANNEL	685.2	639354	4834728	639534	4834510	287	11:06:20	0.115	10	0.5				37756	no fish captured
04/27/2018	974	BROWNSVILLE BAY	690.9	639232	4842463	639065	4842386	543	13:22:00	0.2	12.4	1				37761	no fish captured
04/27/2018	986	RAFT CHANNEL	686.1	639073	4835920	639189	4835112	836	10:27:45	0.371	9.8	2				37755	no fish captured
04/27/2018	989	MAIN CHANNEL-POOL 8	687.2	640151	4836871	640168	4836863	57	11:33:40	0.058	9.4					37757	no fish captured
04/27/2018	990	MAIN CHANNEL-POOL 8	686.2	640899	4836035	640902	4836051	71	11:59:00	0.05	9.4	1.5				37759	no fish captured
04/27/2018	1700	LAWRENCE LAKE	691.7	639272	4843765	639341	4843962	343	13:47:30	0.175	15.3	1.5				37762	no fish captured
04/27/2018	2589	MAIN CHANNEL BORDER-POOL 8	686.4	640375	4836130	640394	4836131	51	11:47:45	0.038	9.5	1.5				37758	no fish captured
04/15/2019	154	I-90 BAY	701.6	636563	4857278	636392	4857352	207	14:20:00	0.167	6	2.8				39468	no fish captured
04/15/2019	415	EAST CHANNEL	702	636872	4857898	636876	4857979	112	15:56:00	0.067	5.9	2.5				39471	no fish captured
04/15/2019	1140	EAST CHANNEL	700	638458	4854921	638412	4854816	223	13:20:00	0.167	6.1	1.8				39467	no fish captured
04/15/2019	1155	EAST CHANNEL	702.1	636700	4858083	636600	4858133	120	15:05:00	0.083	5.9	2				39470	no fish captured
04/15/2019	1156	EAST CHANNEL	702.1	636954	4858016	636855	4858059	216	14:45:00	0.167	5.9	1.8	6	U	I	39469	walleye
04/15/2019	1157	BACKWATERS OFF FRENCH SL., RMI 700.3	700.5	639098	4855592	638925	4855486	433	12:10:00	0.333	4.8	2				39465	no fish captured
04/15/2019	1406	EAST CHANNEL	700.1	638407	4855103	638290	4855007	205	12:50:00	0.167	6.1	2				39466	no fish captured
04/23/2019	18	POOL 8 TAILWATER	702.3	636427	4858282	636590	4857994	375	14:55:00	0.1	10.2	3.5	23.7	F	G	39478	walleye
04/23/2019	18	POOL 8 TAILWATER	702.3	636427	4858282	636590	4857994	375	14:55:00	0.1	10.2	3.5	17.9	F	G	39478	walleye
04/23/2019	18	POOL 8 TAILWATER	702	636679	4857894	636982	4857335	670	15:19:00	0.167	10.3	5				39479	no fish captured
04/23/2019	423	BAY OFF OF FRENCH SLOUGH	700	639180	4854953	639134	4854965	49	12:35:00	0.05	10	2.5				39473	no fish captured
04/23/2019	1150	BACKWATERS OFF FRENCH SL., RMI 700.3	700.8	639031	4855946	639075	4855785	248	12:00:00	0.2	9.8	2				39472	no fish captured
04/23/2019	1151	BAY OFF OF FRENCH SLOUGH	700.3	639043	4855299	639071	4855143	197	12:50:00	0.183	10	2				39474	no fish captured
04/23/2019	1152	EAST CHANNEL	702.2	636613	4858126	636671	4858180	124	13:58:00	0.133	10	2				39475	no fish captured
04/23/2019	1153	EAST CHANNEL	702.2	636668	4858087	636703	4858070	86	14:12:00	0.067	10.1	1.5				39476	no fish captured
04/23/2019	1154	EAST CHANNEL	702.1	636857	4857963	636745	4857941	241	14:30:00	0.183	10.2	2	14.2	U	I	39477	walleye
04/24/2019	17	POOL 8 TAILWATER	701.9	636197	4857794	636522	4857481	478	12:21:50	0.215	10.1	2.1	17.4	F	G	39483	walleye
04/24/2019	17	POOL 8 TAILWATER	701.9	636197	4857794	636522	4857481	478	12:21:50	0.215	10.1	2.1	22.2	F	G	39483	walleye
04/24/2019	18	POOL 8 TAILWATER	702.3	636391	4858345	636677	4857901	546	12:59:00	0.217	10.1	3.2	12.6	U	I	39484	walleye
04/24/2019	18	POOL 8 TAILWATER	702.3	636391	4858345	636677	4857901	546	12:59:00	0.217	10.1	3.2	17.1	F	G	39484	walleye
04/24/2019	18	POOL 8 TAILWATER	702.3	636391	4858345	636677	4857901	546	12:59:00	0.217	10.1	3.2	22.7	F	G	39484	walleye
04/24/2019	18	POOL 8 TAILWATER	702.3	636391	4858345	636677	4857901	546	12:59:00	0.217	10.1	3.2	17.8	F	G	39484	walleye
04/24/2019	18	POOL 8 TAILWATER	702.3	636391	4858345	636677	4857901	546	12:59:00	0.217	10.1	3.2	18.7	F	G	39484	walleye
04/24/2019	18	POOL 8 TAILWATER	702.3	636391	4858345	636677	4857901	546	12:59:00	0.217	10.1	3.2	11.8	U	I	39484	walleye
04/24/2019	290	UNNAMED (CAR STREET MARSH)	699.7	640209	4854667	640262	4854564	254	11:03:00	0.217	12.6	2.8				39480	no fish captured
04/24/2019	426	I-90 BAY	701.5	636547	4857090	636597	4856991	115	13:55:00	0.083	10.4	3.7				39485	no fish captured
04/24/2019	500	UNNAMED (CAR STREET MARSH)	699.5	640324	4854490	640231	4854534	356	11:22:00	0.233	12.5	2.9				39481	no fish captured
04/24/2019	1143	POOL 8 TAILWATER	702.2	635872	4858138	635821	4858216	97	12:07:00	0.067	11.6	1.7				39482	no fish captured
04/24/2019	1144	ROUND L	701.2	637916	4856635	638001	4856876	465	14:12:00	0.25	10.2	2.4				39486	no fish captured
05/02/2019	18	POOL 8 TAILWATER	702.5	636254	4858515	636736	4857670	1026	20:05:00	0.35	11	3.9	16.1	M	R	39487	walleye
05/02/2019	18	POOL 8 TAILWATER	702.5	636254	4858515	636736	4857670	1026	20:05:00	0.35	11	3.9	17.2	F	G	39487	walleye
05/02/2019	18	POOL 8 TAILWATER	702.5	636254	4858515	636736	4857670	1026	20:05:00	0.35	11	3.9	14	U		39487	walleye
05/02/2019	18	POOL 8 TAILWATER	702.5	636254	4858515	636736	4857670	1026	20:05:00	0.35	11	3.9	7.2	NS		39487	walleye
05/02/2019	18	POOL 8 TAILWATER	702.4	636331	4858394	636694	4857778	753	23:00:00	0.267	10.9	3.6	12.9	U		39492	walleye
05/02/2019	18	POOL 8 TAILWATER	702.4	636331	4858394	636694	4857778	753	23:00:00	0.267							

FIGURE 1. LOCATIONS OF SPRING 2018 AND 2019 WALLEYE ELECTROFISHING STATIONS. UPPER POOL 8.



FIGURE 2. LOCATIONS OF SPRING 2018 AND 2019 WALLEYE ELECTROFISHING STATIONS. MIDDLE POOL 8.





It appears our sampling between 4.5 and 15.3° C was within documented Mississippi River walleye spawning temperature ranges. Ickes (1999) and Holzer and Von Ruden (1982) found peak spawning occurred at temperatures ranging from 7.2 to 10.3° C. Pitlo (1983) found peak egg drift at temperatures of 6.7 to 12.2° C. Von Ruden and Holzer (1984) recorded peak spawning at 6.7 to 10° C.

Other sampling gears, like fyke nets, hoop nets and trammel nets may prove more successful. Annually, the Genoa National Fish Hatchery uses fyke and hoop nets to gather enough numbers of pre-spawn walleye to meet their rearing quotas. Priegel and Hickey (1970) successfully used nets and A. C. electrofishing to catch an adequate number of fish to derive population level information and spawning characteristics.

Spring fyke and hoop netting on the Mississippi River is often difficult. Fast current and suspended and floating debris often compromise netting efficiency. Although fyke nets set in a protected location are likely to catch a small number of fish. It may be worth trying.

Biologists can sex walleye during spring. Sexing in the fall would require sacrificing fish. Therefore, spring sampling could provide more biologically relevant information, although sex ratios may not represent the population. During spring, males are more vulnerable to our sampling gears, since they remain in shallow water waiting to spawn. Females remain mostly inaccessible, because they only visit shallow water briefly to spawn and then immediately leave.

CONCLUSIONS

We captured inadequate numbers of walleye using spring electrofishing. Compared to our routine fall tailwater sampling, spring efficacy was poor. Our small catch prohibited comparisons with other WDNR spring sampling events throughout the state and identification of suspected spawning locations. Fall

electrofishing appears more effective than spring. More effort and research may provide effective spring sampling methods for walleye and sauger on the Mississippi River.

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